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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex parte* ROBERT MALCOLM SETBACKEN,
GARY THOMAS RHODES, KEVIN MICHAEL CARBONE, AND
GREGG RICHARD SERVICE,
Appellants

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Appeal 2008-5261
Application 10/829,546[1]
Technology Center 2800

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Decided: September 17, 2008

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Before EDWARD C. KIMLIN, THOMAS A. WALTZ, and
MARK NAGUMO, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge.*

DECISION ON APPEAL

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[1] Application 10/829,546, *Positional Encoder Assembly*, filed 22 April 2004, based on provisional application 60/465,295, filed 25 April 2003. The specification is referred to as the "546 Specification" and is cited as "Spec." The real parties in interest are listed as Renco Encoders, Inc., and Dr. Johannes Heidenhain GmbH. (Appeal Brief filed 20 April 2007 ("Br."), 2.)

## A. Introduction

Robert Malcolm Setbacken, Gary Thomas Rhodes, Kevin Michael Carbone, and Gregg Richard Service ("Setbacken") timely appeal under 35 U.S.C. § 134(a) from the rejection of claims 1-14 and 27-47, which are all of the pending claims. We AFFIRM.

According to Setbacken, the subject matter on appeal relates to optical measurement devices. (Spec. 1:[0002].) More particularly, Setbacken seeks exclusive rights to a "positional encoder assembly" as defined by representative claim 1, which is reproduced below. Labels in square brackets corresponding to features illustrated in Figures 2, 3, and 6 have been added to illustrate, but not to limit, the claimed subject matter.

Claim 1 (Annotated):

A positional encoder assembly [**10**] comprising:

a light source [**50**] to generate an optical signal;

an optical support structure [**12**] housing a refractive optic [**32**] to direct the optical signal, the optical support structure [**12**] defining a projection [**30.1**, **30.2**];

a lead frame [**34**] defining a cavity [**40**],

a hollow [**47**] within which [**47**] the light source [**50**] is disposed, and

at least one recess [**46.1**, **46.2**] to receive the projection [**30**]; and

a sensor [**36**] disposed within the cavity [**40**]

and adapted to generate an electrical signal in response to the optical signal,

the electrical signal distributed to a circuit board assembly [**16**];

wherein the lead frame [**34**] is disposed on the circuit

board assembly [**16**] such that

the sensor [**36**] is disposed at a predetermined elevation with respect to the circuit board assembly [**16**].

{546 Specification Figures 2 and 3 are reproduced below:}[2]

Fig. 2

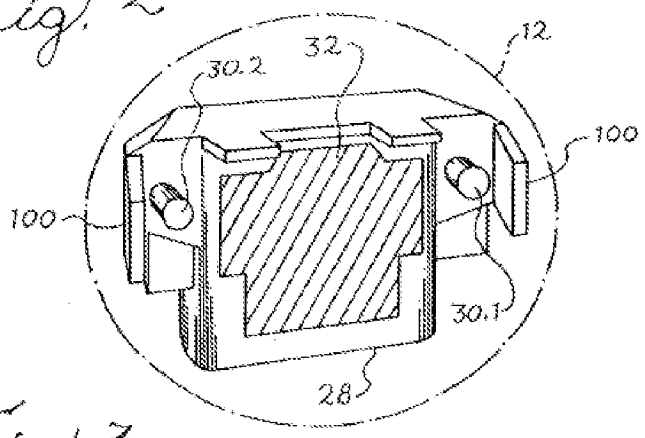
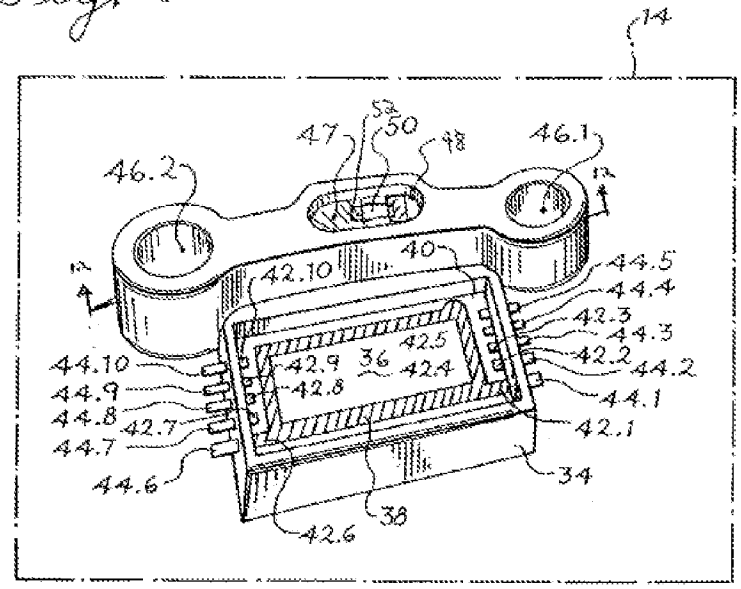


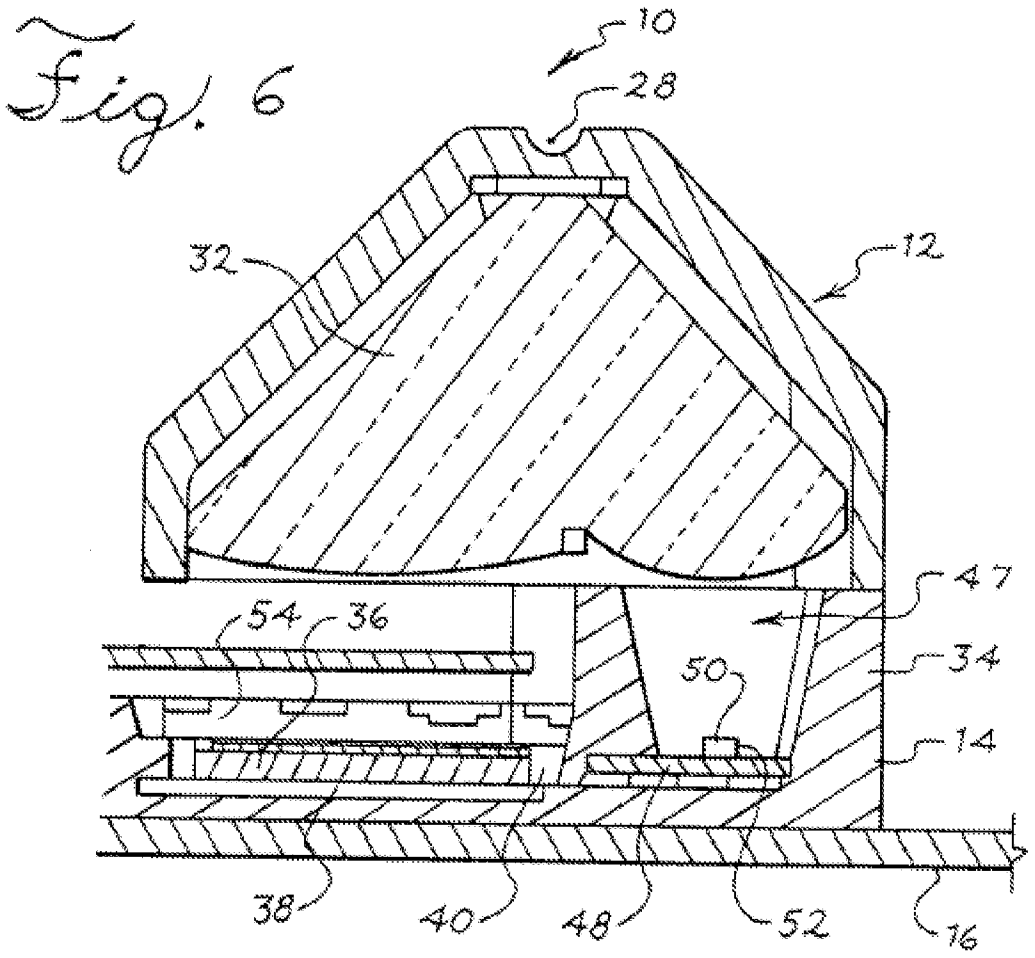

Fig. 3




{546 Specification Figure 2 is said to show an optical support structure. 546 Specification Figure 3 is said to show a lead frame assembly }

[2] The text in curly braces following the Figures is provided to ensure compliance with section 508 of the U.S. Rehabilitation Act for publication of this Decision on the USPTO website pursuant to the Freedom of Information Act. It is not part of the Decision.

{546 Specification Figure 6 is reproduced in part below:}




{546 Specification Figure 6 is said to show a partial cross section of an optical positional encoder assembly.}

The Rejections

The Examiner has maintained the following rejections:

A. Claims 1, 3-6, 11-14, 27, 28, 34-38, and 44-46 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Okumura[3] and Leong.[4]

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[3] Ichiro Okumura et al., *Optical Encoder*, U.S. Patent 6,803,560 B1, issued 12 October 2004, based on application 09/588,549 filed 7 June 2000.

[4] Ak Wing Leong et al., *Optical Navigation Sensor with Integrated Lens*, U.S. Patent 7,045,775 B2, issued 16 May 2006, based on application

B. Claims 7-10, 30-33, 40-43, and 47 stand rejected under 35 U.S.C. § 103(a) over the combined teachings of Okumura, Leong, and Chin.[5]

C. Claims 2, 29, and 39 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Okumura, Leong, and Franklin.[6]

## B. Findings of Fact

Findings of fact (FF) throughout this Decision are supported by a preponderance of the evidence of record.

The 546 Specification

1. According to the 546 Specification, the disclosed invention relates to the field of optical measurement devices, more particularly, to the field of optical encoders utilizing precision light emission coupled with light sensing and data processing electronics. (Spec. 1:[0002].)

2. Embodiments of typical positional encoder assemblies are said to comprise a sensor "deposited on" a printed circuit board, the sensor generally being "coupled to processing circuitry through a series of leads and wires." (Spec. 1:[0003].)

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11/182,226, filed 15 July 2005, which is said to be a continuation of application 10/286,252, filed 1 November 2002.

[5] Yee Loong Chin and Siang Leong Foo, *Dual-Axis Optical Encoder Device*, U.S. Patent Application Publication US 2003/0193016 A1 (16 October 2003), based on application 10/369,942, filed 20 February 2003.

[6] Ruth E. Franklin and Richard Mathew Forsyth, *Multiple Resolution Photodiode Sensor Array for an Optical Encoder*, U.S. Patent 6,727,493 B2, issued 27 April 2004, based on application 09/992,542, filed 6 November 2001.

3. The sensitive electronics are then said to be covered and protected by encapsulating gels. (Spec. 1:[0003].)

4. According to the 546 Specification, "the geometrical sensitivity of the encoder is compromised" in affixing the sensor to the printed circuit board, and the operability of the system of which the encoder is to be a part may be affected. (Spec. 1:[0004].)

5. The encapsulating gels are said to compound the difficulties. (Spec. 1:[0005].)

6. According to the 546 Specification, "the present invention is an improved positional encoder assembly including in part an optical support structure and a lead frame wherein the lead frame advantageously supports and contains a sensor and its attendant electronics." (Spec. 10:[0058].)

7. The problems of the prior art are said to be avoided by the invention, in which the positional encoder assembly includes a light source, an optical support structure to direct the optical signal, and a lead frame coupled to the optical support structure via a projection in the optical support structure that mates with a recess in the lead frame. (Spec. 2:[0007].)

8. Moreover, the lead frame is said to define a cavity that holds an optical sensor, the electrical signal of which is distributed to a circuit board assembly on which the lead frame is disposed. (Spec 2:[0007].)

9. In the words of the 546 Specification, "the lead frame having a cavity defined therein provides an exact height of the sensor above the circuit board assembly which is of particular aid in the design of the encoder product." (Spec. 2:[0009].)

10. In the embodiment illustrated in Figures 2, 3, and 6, reproduced *supra*, light provided by LED **50** in hollow **47** is directed by optic **32**, held in optical support structure **12**, to sensor **36** in cavity **40**, which is formed in lead frame **34**. (Spec. 5:[0034]-[0035].)

11. Optical support structure **12** is mated to lead frame **34** via projections **30** (see Figure 2), which fit into recesses **46** (see Figure 3). (Spec. 7:[0040].)

12. Electrical signals produced by sensor **36** are distributed via pads **42** and external connectors **44** (Figure 3) to circuits on printed circuit board **16** (Figure 6). (Spec. 6:[0037].)

13. Among the advantages of the present design is said to be the rigidity of lead frame **34**, which is said to provide an exact height of the sensor **36** above the circuit board assembly **16**, which in turn is said to be of particular aid in the design of the encoder product. (Spec. 8-9:[0047].)

14. The 546 Specification does not further describe the "particular aid" or how that aid assists or improves designs of encoder products.

15. The projections **30** and recesses **46** are said to provide a snap-fit, rigid connection of the optical support structure **12** and the lead frame assembly **14**, thus permitting installation of the parts in a "top-down fashion consistent with the practices of Design for Manufacturing and Assembly." (Spec. 10:[0057].)

16. The 546 Specification concludes with the following statement: "it is understood that the preceding description pertains only to a preferred embodiment, and that various modifications to the present invention can be made by those skilled in the art without departing from the scope of the

present invention as set forth in the following claims."
(Spec. 10-11:[0058].)

Okumura

17. Okumura relates to an optical encoder for detecting the position or speed of a moving object. (Okumura 1:5-10.)

18. According to Okumura, Figure 2, which is reproduced on the following page, is a cross sectional view of a conventional optical system in self-emitting optical encoder. (Okumura 1:22-25.)

19. The device is said to comprise, *inter alia*, a light source **1**, such as an LED, a lens system **2**, and a light receiving device **6**, all "held in a fixed state in a housing **8**." (Okumura 1:25-42.)

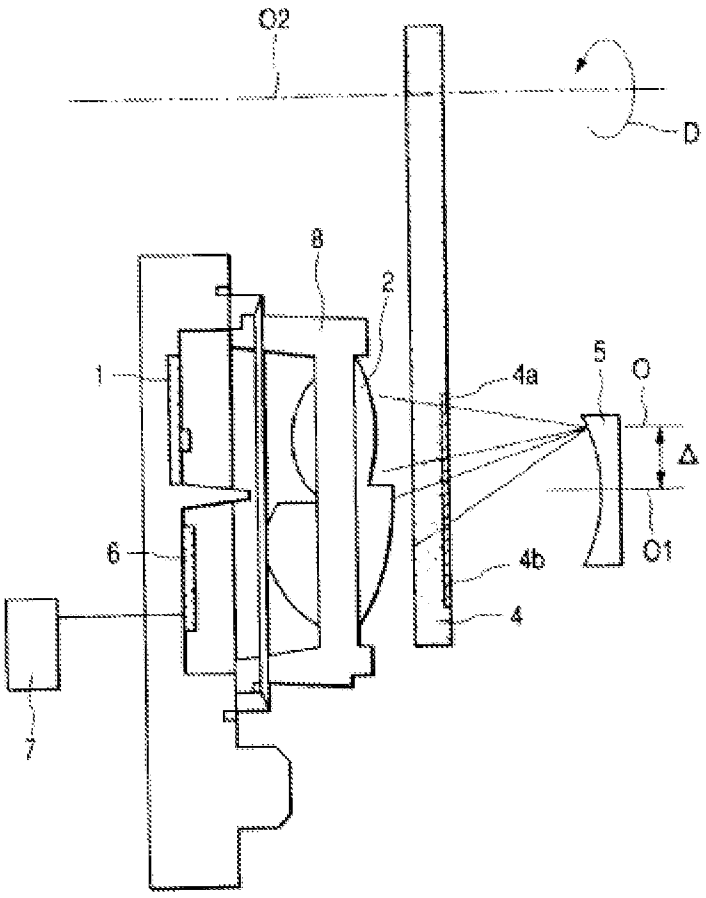
20. The output of the light-receiving device **6** is described as being connected to a signal processing unit **7**. (Okumura 1:38-39.)

21. Although light source **1** and sensor **6** are shown in hollows or cavities, Okumura does not describe sensor **6** as being disposed in a cavity of a lead frame.

22. Moreover, Okumura does not describe a projection-and-recess mating of the optical support structure carrying optic **2** to a lead frame carrying sensor **6**.

23. {Okumura Figure 2 is reproduced below:}

FIG. 2




{Okumura Figure 2 is said to show a cross sectional view of an optical encoder.}

Leong

24. Leong relates to an optical navigation sensor apparatus that is said to be particularly suited for use in an optical computer mouse.
(Leong 1:11-14.)

25. Such devices, according to Leong, typically have a number of components, including an electronic chip that functions as a camera that continually records images of the surface that the mouse is resting on, and

that determines the speed and direction in which the mouse is moving. (Leong 1:18-25.)

26. According to Leong, "[t]he invention provides an improved optical navigation sensor apparatus through use of an optical navigation sensor having the electronic chip, an aperture plate, and an imaging lens, integrated into a single package. (Leong 2:20-23.)

27. In Leong's words, "[a]ccording to one aspect of the invention, the sensor housing is a lead frame. In some forms of the invention the sensor housing is an insert molded lead frame." (Leong 2:37-39.)

28. Leong Figures 3 and 4 are said to show an embodiment of an optical navigation sensor apparatus **40** including an optical sensor **42** that is part of an optical computer mouse **46**. (Leong 3:48-51.)

{Leong Figure 3 is reproduced below:}

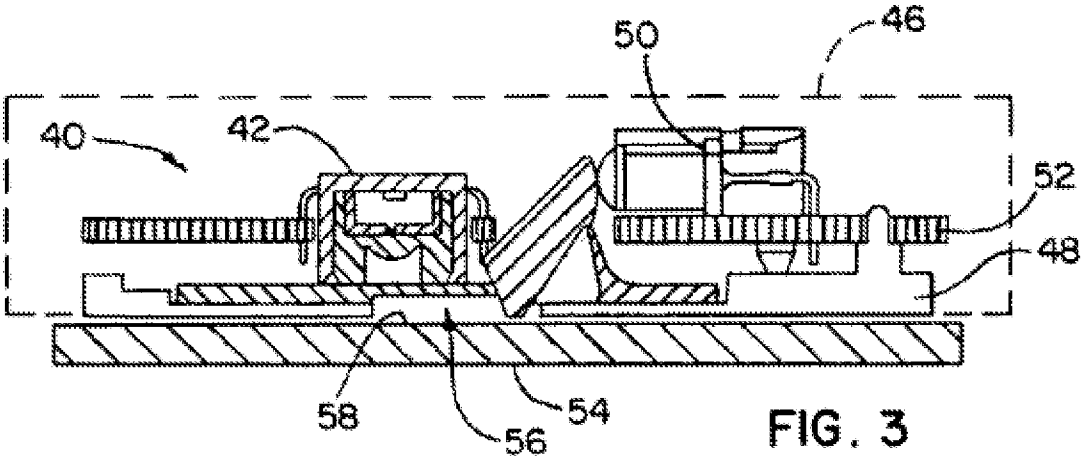



FIG. 3

{Leong Figure 3 is said to show a cross sectional view of an optical navigation sensor for an optical mouse.}

29. As illustrated in Figure 4, which is reproduced on the following page, optical navigation sensor **42** is said to include a sensor housing **60**, an

electrical chip **62**, an aperture housing **64**, and an imaging lens housing **66**. (Leong 3:62-64.)

30. {Leong Figure 4 is reproduced below:}

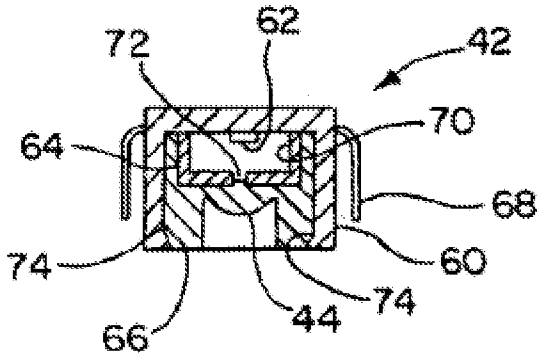



FIG. 4

{Leong Figure 4 is said to show a cross sectional view of an optical sensor}

31. Sensor housing **60** and lens housing **66** are said to "include complimentary snap action features, as indicated at **74**, for conveniently securing the lens housing **66** and aperture housing **64** to the sensor housing **60**." (Leong 4:13-16.)

32. The sensor housing **60** is said to be an insert molded lead frame, having a series of contacts **68** for electrically connecting the lead frame to the circuit board **52**. (Leong 3:64-67; see Figure 3, *supra*.)

The Examiner's Rejection

The Examiner finds that Okumura describes a positional encoder assembly that includes all of the limitations recited in Setbacken claim 1 but for: (1) the optical support element defining a projection and a lead frame having a recess to receive the projection; and (2) the frame **8** is not a lead

frame attached to a circuit board such that the sensor is disposed at a predetermined elevation with respect to the circuit board. (Ans. 3-4.)

The Examiner finds[7] that Leong teaches that "lens housing (66) is attached to the sensor housing (60) via a snap feature (74), which includes a protrusion and a recess." (Ans. 4.) The Examiner finds further that Leong describes a "sensor (42) comprising a lead frame (60) that is attached to a circuit board (Figure 3, column 4, lines 47-50) such that the sensor is disposed at a predetermined elevation with respect to the circuit board." (Ans. 4.)

The Examiner concludes that it would have been obvious to use the snap feature described by Leong to fix the optical element support structure to the frame described by Okumura, to provide alignment as well as a release feature. (Ans. 4.) The Examiner concludes further that it would have been obvious to use a lead frame attached to a circuit board, as described by Leong, to connect the sensor described by Okumura "to facilitate electrical connection to other optoelectronic devices that are also connected to the circuit board." (Ans. 4.)

The Examiner makes further findings of fact regarding limitations in the remaining claims (Ans. 4-11), but because Setbacken did not argue the separate patentability of those claims, with one minor exception discussed *infra*, we need not describe the Examiner's additional findings.

[7] The Examiner refers to Leong Figure 8, but the features can be seen in Leong Figure 4, which is reproduced *supra*.

## C. Discussion

The burden on Setbacken, as the Appellant, is to prove reversible error in the Examiner's rejections. *In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of prima facie obviousness or by rebutting the prima facie case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

Setbacken argues first that the references Okumura and Leong are not properly combinable because Leong is directed to art that is not analogous to the claimed invention. (Br. 9-10.) More particularly, Setbacken urges that Leong is in the field of optical navigation sensors, whereas, according to Setbacken, the claimed invention relates to "positional encoder assemblies." (Br. 10.) Setbacken argues further that Leong is not concerned with a problem reasonably pertinent to problems in the inventor's field, since Leong is concerned with a structure for preventing foreign matter from entering an aperture of an optical navigation sensor. (Br. 10.)

These arguments are without merit. As acknowledged by Setbacken (Br. 10), a prior art reference is relevant if it is within the inventor's field of endeavor, or if not, whether the reference is reasonably pertinent to the particular problem confronting the inventor. *In re GPAC Inc.*, 57 F.3d 1573, 1578 (Fed. Cir. 1995). According to the 546 Specification, "the disclosed invention relates to the field of optical measurement devices, more particularly, to the field of optical encoders utilizing precision light emission coupled with light sensing and data processing electronics. (Spec. 1:[0002];

FF 1.) On the present record, the optical navigation sensor apparatus described by Leong meets these standards. Precision light emission, light sensing, and data processing are all disclosed to be critical features in the optical navigational device described by Leong. Moreover, everyday experience indicates that an optical computer mouse functions as a "positional encoder assembly": it is an assembly that encodes the position of the mouse and transmits that position information to the computer. Moreover, common problems, such as blocking stray light from reaching the sensor, alignment of light source, optics, and light sensor, as well as the desirability of compactly connecting the sensor to analyzing electronic circuitry (noted by the Examiner in the Answer at 4) are addressed by Appellants, Leong, and Okumura. Thus, Leong satisfies both prongs of the analogous art test.

As for the objections based on substantive matters, Setbacken argues, with one exception discussed *infra*, only limitations that are found in claim 1. In particular, Setbacken makes no separate arguments regarding the references Chin and Franklin, noting only that they do not cure the alleged defects of Okumura and Leong. Accordingly, the claims stand or fall with claim 1.

Setbacken next argues that the Examiner's reliance on Leong for the snap feature is irrelevant because claim 1 requires a lead frame disposed on a circuit board, but "the Examiner has conceded at page 3 of the Office Action that Okumura et al. does not disclose a lead frame disposed on a circuit board." (Br. 10-11.) Setbacken does not dispute the Examiner's finding that Leong discloses a projection in an optical support structure that is mated with a recess in a lead frame. Setbacken's argument misses both major

points of the Examiner's rejection. The first point is that Leong provides a teaching to connect the optical support structure directly to the sensor housing.[8] The second point is that that it would have been obvious to embed the sensor taught by Okumura in a cavity in a lead frame as taught by Leong with the aim of gaining the improved connection of the sensor to the analyzing electronics taught by Leong.

Setbacken argues further that Leong does not disclose a lead frame disposed on a circuit board. (Br. 11.) Setbacken does not dispute the Examiner's finding that Leong teaches a lead frame that holds an optical sensor in a cavity and that provides electrical connections for the signal from the sensor to a circuit board assembly. Rather, Setbacken argues that the lead frame taught by Leong is disposed through the circuit board assembly, not "on the circuit board assembly" as required by the claims. (Br. 11.) Similarly, with respect to claims 27 and 37, Setbacken argues that Leong does not disclose a lead frame that is "supported upon a circuit board assembly," as required by those claims. (Br. 14.)

These arguments fail because the ordinary meaning of the language of claim 1, "wherein the lead frame is disposed on the circuit board assembly," and of the language in claims 27 and 37, "a lead frame supported upon the circuit board assembly," does not exclude the disposition of the lead frame as shown in Leong Figure 3. The lead frame **60** is supported in part by

[8] Inspection of Okumura Figure 2 indicates a similar structure for mating the lens-holding section of housing **8** with the light source and sensor portion of that housing. This feature strengthens the Examiner's conclusion that it would have been obvious to the ordinary worker to use the structure taught by Leong in the optical encoder taught by Okumura. We need not speculate whether it was necessary to refer to Leong for this feature.

electrical connections between leads **68** and the circuit board **52**, which ordinarily would be secured by solder. The terms "disposed on" and "supported upon" are broad and general in every day use. Moreover, the 546 Specification does not provide any express definitions of these terms. Nor is there any indication in the disclosure of the particular embodiments that indicate that the narrow interpretation now urged by Setbacken was intended as general limitations of the disclosed and claimed invention. Indeed, the 546 Specification states, to the contrary, that "the preceding description pertains only to a preferred embodiment" Spec. 10:[0058]. We decline to read limitations from particular examples in the specification into the claims. *In re Am. Acad. Sci. Tech. Ctr.*, 367 F.3d 1359, 1369 (Fed. Cir. 2004).

Following our reviewing court's instruction that "the PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997), we conclude the Examiner did not err in reading the claims broadly and refusing to read limitations from particular examples into the claims. We find no merit in Setbacken's arguments in its Reply Brief filed 16 November 2007 ("Reply Br." 2-5) that the Examiner belatedly asserted a new interpretation of the term "disposed."

Finally, Setbacken argues that the limitation that the sensor be disposed at a predetermined elevation with respect to the circuit board assembly is not met or suggested by Leong. (Br. 11.) In particular,

Setbacken argues that the absence of constraints as to where the circuit board engages contacts **68** show that the die (sensor) **62** is not at a predetermined elevation with respect to circuit board **52**. We find no merit in this argument. Neither claim 1 nor the 546 Specification provide a definition or conditions that must be satisfied for the limitation "predetermined elevation . . . " to be met. We observe that the geometry of the device taught by Leong constrains the distance from the sensor **62** to the circuit board 5**2**. A similar constraint would be carried over in the combination Leong and Okumura proposed by the Examiner. That constraint is adequate to meet the predetermined elevation recited in the claims.

Setbacken's arguments with respect to the rejections involving Chin and Franklin are cumulative, as Setbacken argues only that Chin and Franklin do not cure the alleged deficiencies of Okumura and Leong. Accordingly, we do not find these arguments persuasive.

## D. Summary

In view of the record and the foregoing considerations, it is:

ORDERED that the rejection of claims 1, 3-6, 11-14, 27, 28, 34-38, and 44-46 under 35 U.S.C. § 103(a) in view of the combined teachings of Okumura and Leong is AFFIRMED;

FURTHER ORDERED that the rejection of claims 7-10, 30-33, 40-43, and 47 under 35 U.S.C. § 103(a) over the combined teachings of Okumura, Leong, and Chin is AFFIRMED;

FURTHER ORDERED that the rejection of claims 2, 29, and 39 under 35 U.S.C. § 103(a) in view of the combined teachings of Okumura, Leong, and Franklin is AFFIRMED; and

FURTHER ORDERED that no time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

**AFFIRMED**

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